AU7845 Datasheet

USB Host MP3/WMA Decoder SOC

Rev 1.01

Aug 28 , 2008

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Revision History

Data	Revision	Description
2008-7-7	1.0	initial
2008-8-28	1.01	1. Pin order modified 2. Change some electrical specification

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1. Overview

A highly integrated SOC for MP3/WMA player, AU7845 integrates MCU, MP3/WMA decoder, USB Host controller, SD/MMC card controller, a 16-bit audio decoder, RTC, ADC and an IR decoder in a single chip. Compared with traditional flash-MP3 player, AU7845 offers a lower cost, lower power consumption, flexible and more powerful host MP3/WMA player solution.

1.1 Features

- Low power 0.18um CMOS technology
- Power supply 1.8V/3.3V, power consumption 125mW, support sleep mode
- Enhanced 8051, up to 10 times faster than standard 8051
- USB2.0 full-speed host controller
- SD/MMC card controller
- Support MPEG 1/2/2.5 layer2/3 decoding, data rate 32kbps ~ 320kbps, including VBR
- Support WMA format, data rate 32kbps ~ 384kbps
- Support 9 sampling frequency: 8kHz/11.025kHz/12kHz/16kHz/22.05kHz/24kHz/32kHz/44.1kHz/48kHz
- Embedded sound equalizer
- Support tag format ID3v1 and ID3v2.4
- Support FAT16/FAT32 file system
- Embedded 16-bit sigma-delta audio DAC
- Embedded headphone amplifier
- Support IR Remote control
- GPIO for various purposes
- RTC embedded
- 4 channel 10-bit SAR ADC for peripheral controls
- 2 channel AUX in
- Embedded 64KB OTP memory for program code storage
- Support external NOR flash for program code storage
- Support in-system debug through external emulator
- In-system firmware upgrade through U-disk or SD/MMC

1.2 Chip Architecture

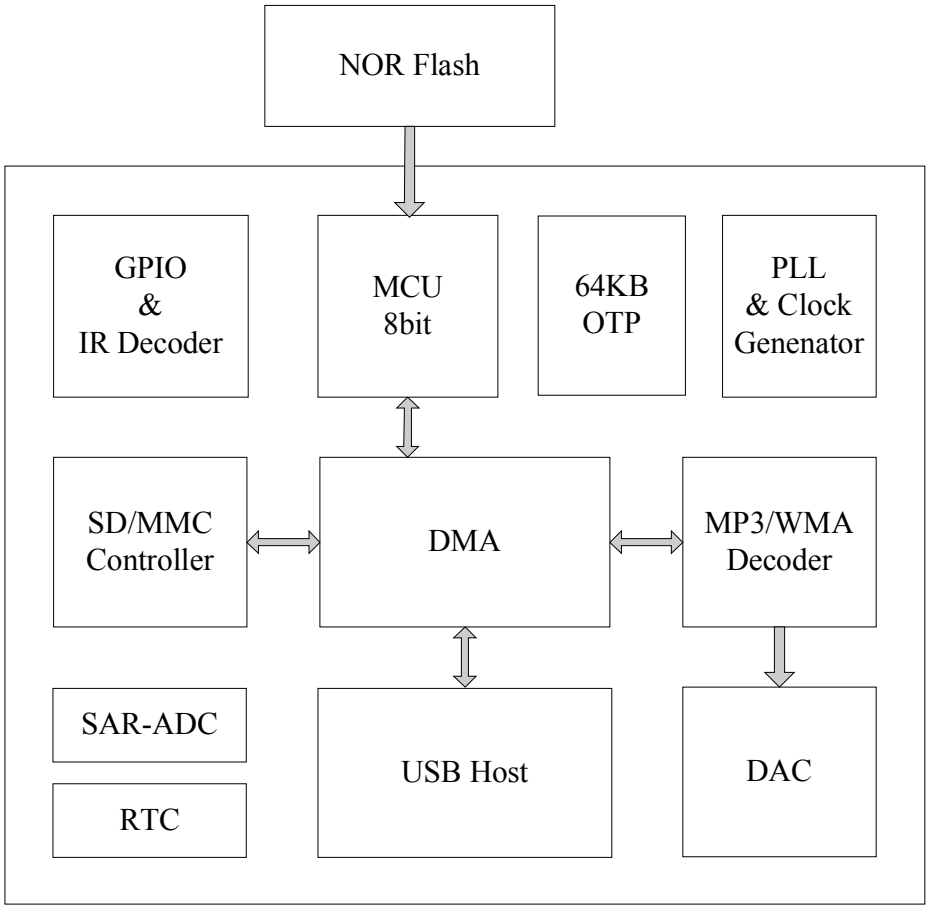

Figure 1 AU7845 Functional Block Diagram

2. System Application

- **MP3/WMA audio system**

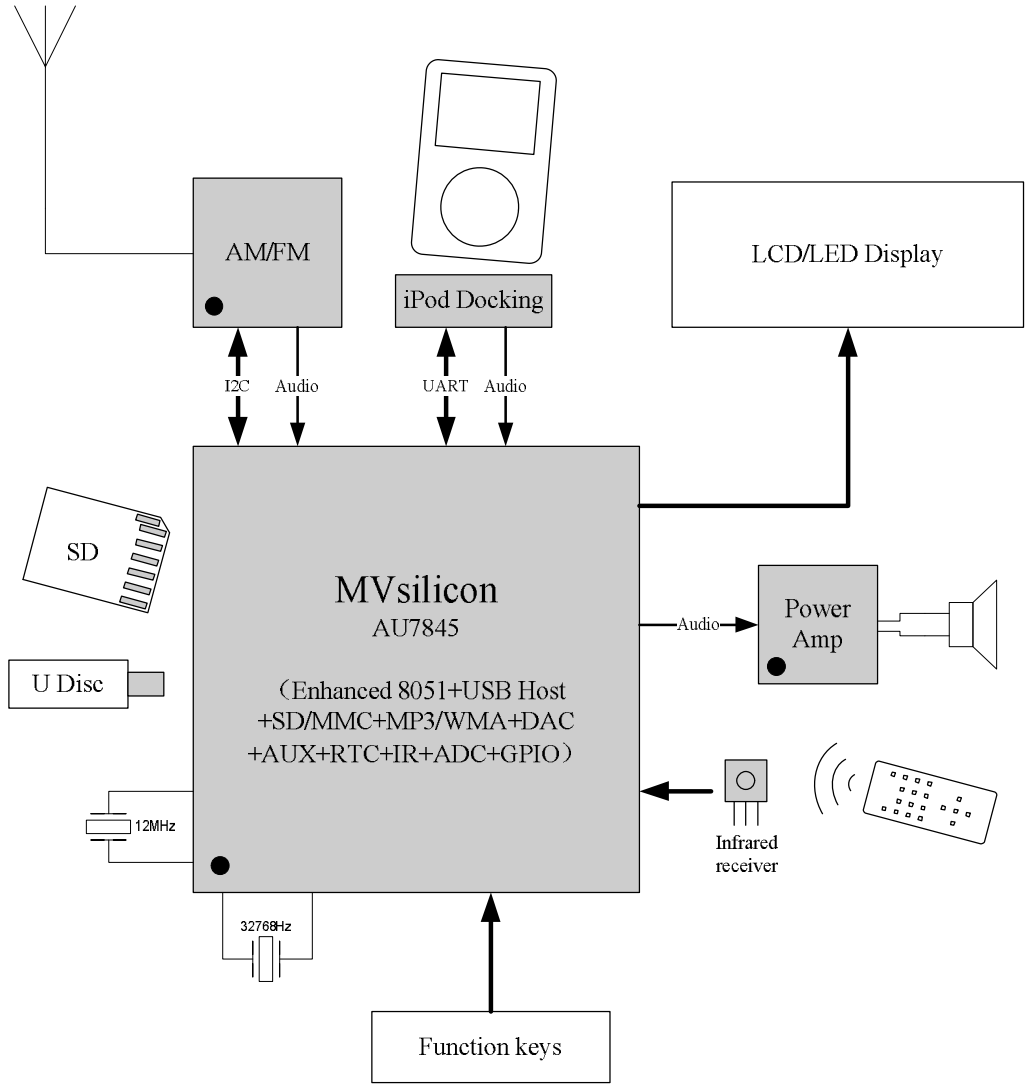

Figure 2 MP3/WMA Audio System

3. Pin Description

AU7845 is a CMOS device. Floating level on input signals causes unstable device operation and abnormal current consumption. Pull-up or Pull-down resistors should be used appropriately for input or bidirectional pins.

Notation	Description
I	Input
O	Output
I/O	Bidirectional
AI	Analog Input
AO	Analog Output
PWR	Power
GND	Ground

3.1 Pin Description

Table 1 Pin Description

Pin name	Pin #	Type	Description
			NOR flash memory interface pins
FSH_DB [7:0]	32:39	I/O	Flash memory data bus
FSH_AB [0:1]	40:41	I/O	Flash memory address bus
FSH_AB [2:3]	57:58	I/O	Flash memory address bus
FSH_AB [4:7]	61:64	I/O	Flash memory address bus
FSH_AB [8:9]	88:89	I/O	Flash memory address bus
FSH_AB [10]	60	I/O	Flash memory address bus
FSH_AB [11]	90	I/O	Flash memory address bus
FSH_AB [12]	65	I/O	Flash memory address bus
FSH_AB [13:14]	87:86	I/O	Flash memory address bus
FSH_AB [15]	66	I/O	Flash memory address bus
FSH_WR	91	I/O	Flash memory write signal
FSH_RD	92	I/O	Flash memory read signal
			USB interface pins
USB_DP	22	I/O	USB Function D+ bus
USB_DM	21	I/O	USB Function D- bus
			CARD interface pins
SD_CLK	51	O	SD Card clock
SD_CMD	53	I/O	SD Card command line
SD_DAT0	54	I/O	SD Card data line
			DAC AUDIO interface pins
DAC_HPOUTR	1	AO	Head phone right channel output
DAC_HPOUTL	3	AO	Head phone left channel output
DAC_VREF	5	AI	Internal voltage reference
AUXIN1_R	97	AI	External AUX in, channel 1 right input

AUXIN1_L	98	AI	External AUX in, channel 1 left input
AUXIN2_R	99	AI	External AUX in, channel 2 right input
AUXIN2_L	100	AI	External AUX in, channel 2 left input
			SAR ADC interface pins
ADC_VREF	8	AI	ADC voltage reference
ADC_REXT100K	9	AI	ADC connected with a 100kohm external resistor
ADC_CH1	10	AI	Analog voltage input, channel 1
ADC_CH2	11	AI	Analog voltage input, channel 2
ADC_CH3	12	AI	Analog voltage input, channel 3
ADC_CH4	13	AI	Analog voltage input, channel 4
			GPIO/MCU IO pins
GPIO_A[3:0]	29:26	I/O	GPIO PORT, bank A
GPIO_A[7:4]	47:44	I/O	GPIO PORT, bank A
GPIO_B[2:0]	50:48	I/O	GPIO PORT, bank B
GPIO_B[7:3]	80:76	I/O	GPIO PORT, bank B
GPIO_C[1:0]	56:55	I/O	GPIO PORT, bank C
GPIO_C[7:2]	73:68	I/O	GPIO PORT, bank C
GPIO_D[0]	75	I/O	GPIO PORT, bank D
GPIO_D[3:1]	85:83	I/O	GPIO PORT, bank D
			CLK & Reset pins
XIN	24	I	12MHz Crystal oscillator input for PLL
XOUT	25	O	12MHz Crystal oscillator output for PLL
RTC_XIN	18	I	32.768KHz Crystal oscillator input for RTC
RTC_XOUT	19	O	32.768KHz Crystal oscillator output for RTC
RESET_N	42	I	System reset, active low
			mod pin
MOD[1:0]	93:94	I	Chip run mode configure pin
TEST	95	I	Chip test pin
			Power/Ground pins
DAC_AVDD	4	PWR	Analog power for DAC(3.3V)
DAC_AVSS	2	GND	Analog ground for DAC
PLL_VSS	14	GND	Analog ground for PLL
PLL_VDD	15	PWR	Analog power for PLL(1.8V)
ADC_AVDD	7	PWR	Analog power for ADC(3.3V)
ADC_AVSS	6	GND	Analog ground for ADC
VPP	74	PWR	OTP program power
IO_VDD	17 23 52 96	PWR	Digital power for I/O(3.3V)
VSS	20 31 59 81	GND	Digital IO/core ground
VDD	16 30 43 67 82	PWR	Digital power for core (1.8V)

4. Package

4.1 Package Diagram

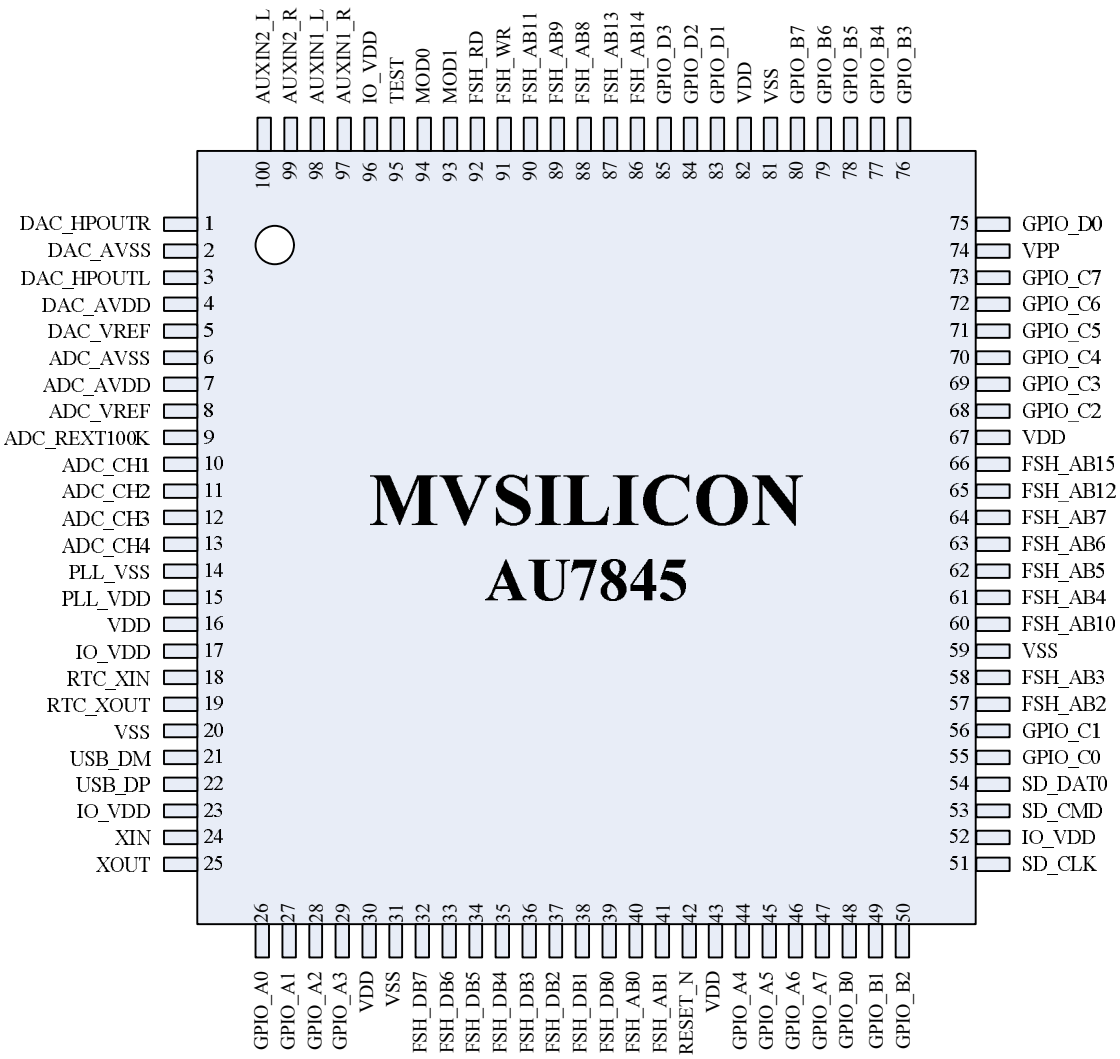

Figure 3 Package Diagram (LQFP100-14x14mm / TOP View)

4.2 Package Dimension Parameter

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	0.15	0.25
A2	1.30	1.40	1.50
A3	0.54	0.64	0.74
b	0.19	—	0.27
b1	0.18	0.20	0.23
c	0.13	—	0.18
c1	0.12	0.13	0.14
D	15.80	16.00	16.20
D1	13.80	14.00	14.20
E	15.80	16.00	16.20
E1	13.80	14.00	14.20
e	0.50BSC		
L	0.40	0.60	0.80
L1	1.00BSC		
θ	0	—	8°

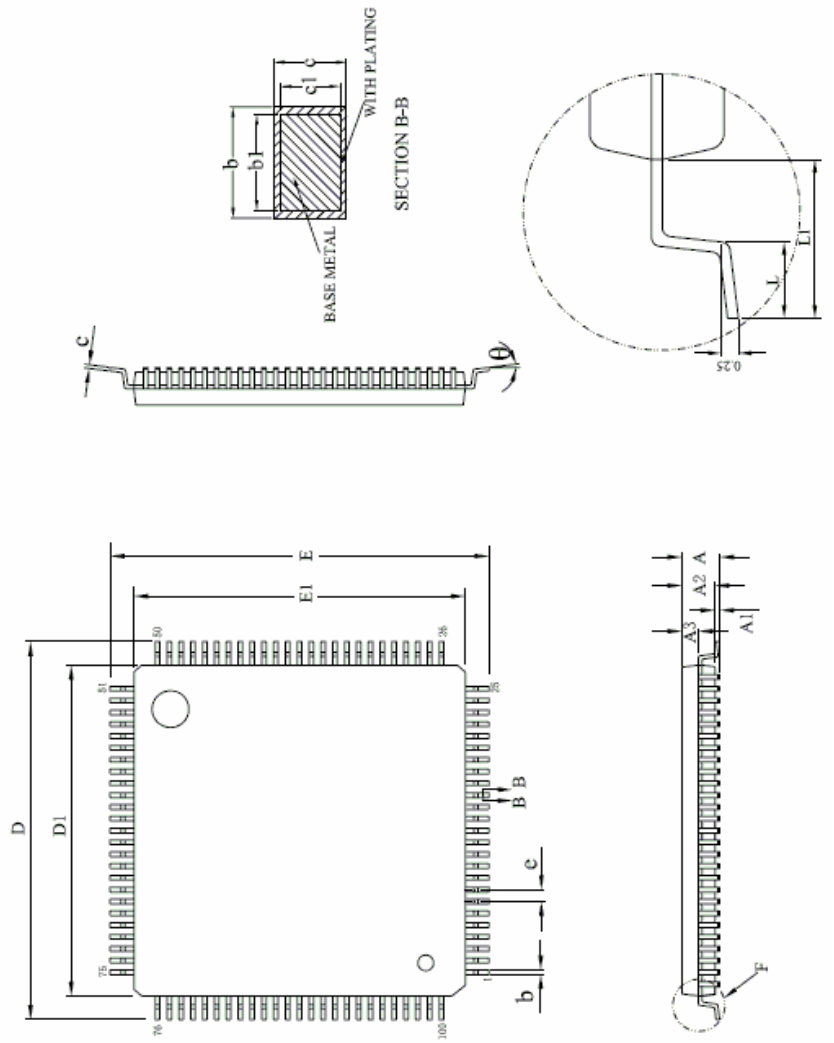

Figure 4 LQFP100-14x14mm Package Dimension Parameter

5. Electrical Specification

5.1 Absolute Maximum Ratings (Note 1)

Table 2 Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Power Supply Voltage (IO)	VCC_IO_AB	-0.5 to 4.6	V
Power Supply Voltage (Core)	VCC_CORE_AB	0 to 2	V
Power Supply Voltage (PLL)	VCC_PLL_AB	-0.2 to 2.2	V
Power Supply Voltage (DAC)	VCC_DAC_AB	-0.3 to 3.6	V
Storage Temperature	TEMP_STG	-65 to 150	C

5.2 Recommended Operating Conditions

Table 3 Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage (IO)	VCC_IO_OP	2.97	3.3	3.63	V
Power Supply Voltage (Core)	VCC_CORE_OP	1.62	1.8	1.98	V
Power Supply Voltage (PLL)	VCC_PLL_OP	1.62	1.8	1.98	V
Power Supply Voltage (DAC)	VCC_DAC_OP	3.0	3.3	3.6	V
Power Supply Voltage (ADC)	VCC_ADC_OP	3.15	3.3	3.45	V
Input Voltage (digital)	VIN	-0.3		5.5	V
Operating_Free Air Temperature	TEMP_OPR	-20		70	C

5.3 Electrical Characteristics

Table 4 Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
VIH	Input High Voltage		2.0		5.5	V
VIL	Input Low Voltage		-0.3		0.8	V
VOH	Output high voltage	@IOH=2mA	2.4			V
VOL	Output low voltage	@IOL=2mA			0.4	V
IOL	Low level output current for 8mA pins	@VOL = 0.4V	9.7	15.6	18.8	mA
IOH	Low level output current for 8mA pins	@VOH = 2.4V	11.6	23.5	36.0	mA
IL	Input leakage current		-10		10	uA
IOZ	Tri-state output leakage current		-10		10	uA
P_PLAY	Power consumption when playing	Playing mode		125		mW
P_SLEEP	Power consumption when sleeping	Sleeping mode		1.5		mW

Note:

1. “Absolute Maximum Ratings” are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits.

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